

PFA 05.02 STATUTORY INSPECTIONS AND TESTS

The Contractor shall, at the start of the Maintenance portion of the Contract perform the required statutory internal and external inspection and hydraulic pressure test in accordance with the manufacturer's specification, the Occupational Health and Safety Act, no 85 of 1993 (as amended) and as specified in Technical Specification FA, on the boiler(s) inside the plant room. During this period all boiler ancillary equipment and components shall be repaired as may be required, serviced, adjusted and tested. The work shall include:

PFA 05.02.01 Internal and external inspection

- (a) Decommissioning of boiler(s) and electrical isolation;
- (b) All required preparation work for the internal and external inspection to the boiler(s), including all items listed under item PFA 05.03;
- (c) Repairs of all defects, replacement of defective equipment/components and servicing of all equipment/components;
- (d) Rendering all the necessary assistance, providing the required equipment and tools for the inspection by the approved Inspection Authority;
- (e) Providing and making sure that all record books and inspection reports and certificates are completed in full and submitted to the Departmental representative/Engineer;
- (f) Reassembling, recasting, refitting and adjustment of all boiler equipment components and ancillary equipment.

PFA 05.02.02 Hydraulic pressure tests

- (a) All preparation work required for the hydraulic pressure test to the boilers;
- (b) Rendering all the necessary assistance, providing the required equipment and tools for the test by the approved Inspection Authority;
- (c) Putting the boilers under the required pressure for witnessing by the Inspection Authority;
- (d) Providing and making sure that all record books and inspection reports and certificates are completed in full and submitted to the Departmental representative/Engineer;

- (e) Reassembling, recasting, refitting and adjustment of all boiler equipment, components and ancillary equipment.

PFA 05.03 REPAIR WORK TO BOILERS AND ANCILLARY EQUIPMENT

The following refers to work required in preparing boilers for statutory inspections. Refer to Standard Specification FA clause FA 13.03.

PFA 05.03.01 Coal-fired boilers

- (a) Boiler shell water side:
 - (i) Clean out and descale boiler.
 - (ii) Inspect boiler water side and integral pipework.
 - (iii) Replace all manhole, hand hole and mud hole cover seals and joint rings.
 - (iv) Replace fusible plug.
 - (v) Execute any required repair work to boiler as directed by the Inspection Authority or the Departmental representative/Engineer.

- (b) Boiler shell gas side:
 - (i) Clear and clean out all dust, slag, ash, grit and foreign matter.
 - (ii) Brush and clean out all fire tubes.
 - (iii) Inspect boiler gas side.
 - (iv) Allow for any replacement of tubes and required repairs as result of the inspection as directed by the Inspection Authority or the Departmental representative/Engineer.
 - (v) Replace all smoke box covers and door joint seals and insulation with new approved joint seals and insulation.

- (c) Integral pipework:
 - (i) Clear and clean out all integral pipework and fittings.
 - (ii) Inspect boiler gas side.
 - (iii) Allow for any required repairs as result of the inspection as directed by the Inspection Authority or the Departmental representative/Engineer.

- (d) Boiler valves and mountings:
 - (i) Dismantle, remove and strip down all boiler valves.
 - (ii) De-scale and clean all boiler valves and mountings.
 - (iii) Inspect boiler valves and mountings.
 - (iv) Overhauling all boiler valves by approved Departmental Representative/Engineer.
 - (v) Hydraulic testing, setting, adjustment and reassembling of all boiler valves.
 - (vi) Certification of boiler valves in accordance with manufacturer's specification.
 - (vii) Replace boiler mountings.
 - (viii) Test and adjust safety valves.
 - (ix) Refitting, installing, testing and adjustment of all boiler valves and mountings.

- (e) Refractories and brickwork:
 - (i) Remove and break down all refractories and brickwork.
 - (ii) Recast and install new brick work on completion of inspection.

- (f) Lagging and cladding:
 - (i) Replace lagging and cladding to oil-fired boilers on completion of statutory inspections and tests with new stainless steel cladding as specified by the manufacturer.

PFA 05.03.02 Feed-water equipment and controls

- (a) Feed-water tank:
 - (i) Isolate, empty, clean out, de-scale and inspect feed-water tank.
 - (ii) Check make-up water ball float valve and adjust to correct level.
 - (iii) Internally line tank with anti-corrosion coating suitable for 110°C operating temperature.
 - (iii) Refill tank with treated make-up water.
 - (iv) Prepare and repaint tank stand and exposed steel parts.
 - (v) Allow for temporary feed-water tank during repairs to feed-water tank including all temporary pipes and fittings.

- (b) Feed-water pumps:
- (i) Isolate, strip, dismantle, de-scale and clean out feed-water pumps.
 - (ii) Inspect, and report on condition of pump and motor components.
 - (iii) Replace packings, seals, bearings and gaskets.
 - (iv) Replace any worn-out or/and damaged parts and components on report back as directed by the Departmental representative/Engineer.
 - (v) Clean out pump strainers.
 - (vi) Inspect and repair pump mountings.
 - (vii) Refit, install and test feed-water pumps.
- (c) Water level equipment and controls:
- (i) Dismantle, strip, de-scale and clean dual and single switch float operated controls (Mobrey type).
 - (ii) Dismantle, strip, descale and clean water level gauge glasses and replace gauge glasses and gaskets. Refit to boiler.
 - (iii) Dual and single level controls to be overhauled, inspected, tested, adjusted and refitted.
 - (iv) Test alarm levels and operation.
 - (v) Test blow-down valves and operation.

PFA 05.03.03 Combustion and draught equipment

- (a) Stoker and stoker controls:
- (i) Remove stoker from boiler furnace during the statutory inspections.
 - (ii) Inspect and replace burnt or/and damaged chain grate links and rods where necessary.
 - (iii) Replace chain grate bearings.
 - (iv) Inspect sprockets and replace if required.
 - (v) Inspect shafts, rear roller and re-machine or replace if necessary.
 - (vi) Inspect stoker chassis for straightness, alignment and possible damages, and repair if necessary.
 - (vii) Inspect under grate damper guide vanes and ensure that they are clean of any dust, slag and foreign matter.

- (viii) Renew and recast all refractories and brickwork in accordance with the manufacturer's specification.
 - (ix) Inspect main worm wheel for any defects and replace if necessary.
 - (x) Replace all joint seals with new.
 - (xi) Reassemble stoker and stoker components.
 - (xii) Replace guillotine door support cables.
 - (xiii) Inspect, service and overhaul stoker drive and gearbox in accordance with the manufacturer's specification.
 - (xiv) Replace shear pin.
 - (xv) Adjust and readjust grate tension.
 - (xvi) Check and adjust fuel bed depth indicator.
 - (xvii) Lubricate all required lubrication points as directed by the manufacturer.
 - (xviii) Mount FD (Forced Draft) fan and controls onto stoker.
 - (xix) Reinstall stoker into boiler furnace in accordance with manufacturer's specification.
- (b) Fan and damper controls:
- (i) Dismantle, strip down FD (Force Draft) and ID induction fan and damper control equipment during the statutory inspections.
 - (ii) Inspect fan impeller blades, clearances, etc, for correct curvature and clearance adjustment. Replace damaged parts and components.
 - (iii) Replace FD and ID fan bearings with new if required
 - (iv) Inspect fan casings and repair if required.
 - (v) Clean casings, prepare and repaint.
 - (vi) Inspect damper controls and dampers for free movement, fan impeller clearance adjustment, control movements and settings. Repair, service and replace any defective equipment.
 - (vii) Test fan motor windings for balanced phases, insulation test and check wiring.
 - (viii) Lubricate all required lubrication points as directed by the manufacturer.
 - (ix) Inspect fan mountings and repair if necessary.
 - (x) Reassemble and refit fans, damper controls and dampers.

- (c) Combustion controls:
 - (i) Inspect, service, adjust and repair where necessary combustion control equipment.
 - (ii) Lubricate all required lubrication points and replace oils as directed by the manufacturer.
 - (iii) Inspect mountings and repair if necessary.

- (d) Chimneys:
 - (i) Inspect and clean chimney stacks.
 - (ii) Inspect guyed cables securing points, repair if necessary and re-tension and secure fixing points.
 - (iii) Repair flashing and seal chimney stack roof penetrations.
 - (vi) Prepare and repaint chimney stacks.

PFA 05.03.04 Coal Handling and Conveying Equipment

- (a) Coal Bunkers:

The coal bunkers or coal storage shall be inspected, cleaned out, and damaged structural elements and brickwork be repaired.

- (b) Coal Conveying Equipment:

The coal conveying equipment shall be inspected, serviced, tested, and repaired and, where necessary, components be replaced. All repair and service work shall be done strictly in accordance with the manufacturer's specification.

PFA 05.03.05 Ash and Grit Removal Equipment

- (a) Grit Collectors:

The grit collector shall be inspected, serviced, tested, repaired and, where necessary, components be replaced. All repair and service work shall be done strictly in accordance with the manufacturer's specification.

- (b) Ash Conveying Equipment:

if ash conveying equipment are installed these equipment shall be inspected,

serviced, tested, repaired and, where necessary, components be replaced. All repair and service work shall be done strictly in accordance with the manufacturer's specification.

(c) Ash and Grit Trolleys:

All ash and grit trolleys are to be inspected, serviced and repaired where necessary.

PFA 05.03.06 Electrical installation, wiring and control panels

(a) Instrumentation and controls:

- (i) Inspect, test, service and clean all instrumentation and control equipment.
- (ii) Inspect, test, service, recalibrate and adjust steam pressure detector and pressure gauge.
- (iii) Inspect all access ports and discharge ports and replace all joint seals and gaskets with new.
- (iv) Repair and/or replace any defective parts or/and components.

(b) General electrical power and lighting installation:

- (i) Inspect, test, service and clean the complete general electrical power installation, including distribution boards, lighting, power points, etc.
- (ii) Repair and/or replace any defective parts or/and components, including replacing light fitting globes.

(c) Electrical control panels:

- (i) Inspect, test, service and clean all the electrical control panels.
- (ii) Inspect and test the operation and condition of all MCBs, motor starters, overloads, indication lights, control equipment, selector switches, etc., and replace where necessary.
- (iii) Check and repair/replace all primary and secondary control panel wiring for proper conducting and replace where required.
- (iv) Clean out control panels interior and exterior, inspect panel body, fascias, doors, paintwork, etc., and repair where necessary.

- (d) Extract fans
 - (i) Clean, check and repair

PFA 05.03.07 Water treatment equipment

- (a) Water softener:
 - (i) Inspect, test, descale, service and clean the water softener equipment.
 - (ii) Sample and analyze feed-water, and adjust water softener to the correct water hardness as specified by boiler manufacturer.
 - (iii) Check and clean out salt container and recharge with salt.
- (b) Chemical dosing equipment:
 - (i) Inspect, test, service, clean and re-commission the chemical dosing equipment and re-connect to the feed-water supplies.
 - (ii) Sample and analyze feed-water, and adjust chemical dosing equipment to the correct water quality as specified by boiler manufacturer.
 - (ii) Ensure that each chemical container is filled with the correct chemicals for this application.

PFA 05.03.08 Boiler house ancillary equipment

- (a) Blow-down sump:
 - (i) Empty, clean out, de-sludge and inspect blow-down sump, manhole covers and frames, sparge pipe, vent and other piping for any defects and damages.
 - (ii) Repair/replace all defects and damages.
 - (iii) Put blow-down sump back into operation.
- (b) Ladders and galleries:
 - (i) Clean and inspect ladders and galleries for any defects, corrosion, mountings and supports.
 - (ii) Repair/replace all defects and damage.
 - (iii) Prepare and repaint ladders and galleries.

- (c) Painting of equipment, plant and building:
 - (i) Clean, prepare and repaint boiler house interior walls, structure, doors, frames, inside roof, etc., in accordance with Specification OWG 371: Specification of Materials and Methods to be used (Fourth edition, October 1993 or latest version).

PFA 05.03.09 Piped installations

Refer to Technical Specification FB: Steam Distribution Installations.

- (a) Steam and condensate installation:
 - (i) Clean, test, inspect, service and repair all steam and condensate pipe fittings, accessories, components and equipment inside the boiler house.
 - (ii) Supply, deliver, install, test, commission, and hand over a water meter on the feed water line to each boiler inside the boiler house. This shall include all cutting into existing pipework, fixing, bracketing, fittings, testing and putting back into operation of the feed water line. This water flow meter shall be of Kent or equal and approved manufacture. This equipment shall be installed and commissioned as directed by the manufacturer complete with all ancillary equipment and components.
 - (iii) Repair/replace all defective and damaged equipment and components.
 - (iv) Fit a steam flow and pressure recorder. The recorder shall be capable of graphically showing steam pressure in kilo-Pascals' and flow in kg/hr on a monthly basis. In addition the recording system shall be capable of printing out the average steam pressure for the month as well as the total quantity of steam supplied either in kilograms or tonnes. The unit shall be complete with orifice plate and electronic data capturing equipment and all electrical connections and equipment required to enable it to function reliably under the conditions of high temperature imposed on it. It shall be a continuously rated device. Provision shall be made for easy and quick replacement of any component should it be required. A calibration certificate from a recognized testing authority competent to check the accuracy of the unit shall be supplied with it.

- (b) Blow-down pipe installation:
 - (i) Clean out blow-down pipe channel and replace all blow-down and drain pipework and accessories.
 - (ii) All blow-down and drain pipework shall be done with steam schedule 40 piping and welded fittings.

- (iii) Check that the drainage point to the channel is open and functioning properly.
- (iv) Test and hand over pipe system.

PFA 06 DETAILS OF MAINTENANCE WORK

PFA 06.01 GENERAL

The Contractor shall be responsible for the complete maintenance of all the equipment, components, installations and systems forming part of this repair and maintenance contract for Steam Boiler Plant from the commencement of the contract until final completion. The Contractor shall strictly adhere to Technical Specification FA: Steam Generating Installations, with regard to the maintenance period, obligations, responsibilities, actions and activities, etc., which shall also include the following maintenance actions:

- (a) Routine preventative maintenance
- (b) Corrective maintenance
- (c) Breakdown maintenance

The actions will not be limited to only the guidelines provided in the Technical Specification FA, but shall also include all additional actions, work, materials, etc., necessary to maintain this installation at an acceptable level.

For this particular installation fatal breakdown shall be defined as all boilers in the boiler house being unable to provide steam to the system.

Emergency breakdown shall be defined as any other equipment, components, and systems preventing the provision of steam at the required pressure and flow to the system.

PFA 06.02 ADDITIONAL MATERIALS

For this particular installation the contractor shall be responsible for providing the required quality and quantity of chemicals and salts to operate and maintain the boilers for a period of 24 months. The Contractor shall ensure that the boiler feed water supply to the boiler conforms to the following by providing the required water treatment.

(i)	Total dissolved solids	350 mg/litre (max)
(ii)	Total alkalinity	350 to 700
(iii)	Caustic alkalinity	350 mg/litre (max) 150 mg/litre (min)
(iv)	Phosphate residual	30 to 60 mg/litre
(v)	Sulphate residual	30 to 50 mg/litre
(vi)	Calcium hardness	Zero
(vii)	pH	10.5 to 11.4

Sampling and analysis of feed water shall form part of the Contractor's routine preventative maintenance responsibilities. The chemicals and water treatment system shall comply in all respects with the specification FA 11 and the boiler manufacturer's requirements.

PFA 06.03 OPERATION OF THE BOILERS

a) **Introduction**

It is required in terms of this contract that the successful contractor, in addition to the functions described before, take over the day-to-day operation of the complete boiler house at the site.

b) **Occupational Health and Safety Act**

It is required that the boilers be operated at all times strictly in accordance with the regulations and requirements of the Occupational Health and Safety Act as amended.

This covers the following:

- (i) The boiler operators shall be qualified to operate the boilers in terms of the Act.
- (ii) The minimum number of operators required in terms of the regulations shall be adhered to at all times.
- (iii) Gauge glasses shall be blown down on a shift basis.
- (iv) The boilers shall be blown down on a regular basis as dictated by chemical water treatment requirements.
- (v) A comprehensive log book shall be kept of all operations carried out on the boilers.
- (vi) All statutory tests and requirements shall be met and recorded.

c) **Steam Quality and Availability**

It is required that steam be produced and be available immediately upstream of all pressure reducing valves and steam using appliances that operate at boiler pressure at a pressure in the range 600 - 750 kPa gauge at all times. It is estimated that the steam draw-off will amount to approximately 2300 kg's per hour at boilers and however only rated to 1800 kg's per hour.

The current facility requires that steam be available for cooking purposes, laundry operation and domestic hot water production at least between the hours of 2h00 A.M and 17h30 P.M daily. Firing of the boilers will thus have to commence sufficiently in advance of this time to ensure sufficient steam supply to the kitchen for the morning meals to be prepared. To this end it is recommended (but not an absolute requirement) that a timer be fitted and wired into the boiler control panels to enable the boiler(s) on line to be "banked" overnight and to maintain pressure and temperature ready for the early morning steaming requirements.

d) **Change-over of Boilers**

It will be required that the boilers in use be changed on a minimum of a monthly basis in order that the steaming load be spread evenly between two boilers and to provide adequate time for routine maintenance, cleaning and repair (as may be required from time to time). Maintenance and repair of the boilers shall be carried out as specified elsewhere in this document.

e) **Coal Supply**

It will be the **Department of Correctional Services'** responsibility to purchase an appropriate grade of coal suitable for firing in these boilers. The department will be required to ensure that fuel is ordered in good time so as to ensure continuity of operation of the boiler plant.

f) **Method of Payment**

Once approved a recording steam pressure/flow meter shall be installed in the boiler house to sense the steam pressure and flow in the main steam delivery line immediately outside the boiler house. The meter shall be capable of graphically recording the steam pressure over a monthly period together with the steam flow in tones per hour. In addition a facility shall be included to print out the average steam pressure for the period in question together with the total quantity of steam supplied during that period. It is recommended that the contractor have a spare or standby recorder available in case of breakdown of the steam flow recorder as payment will be dependant on these recordings.

Copies of these print-outs together with the graphical recordings shall be attached to claims for payment. Payment will thus be on the basis of a tendered rate per tonne of steam supplied. This rate shall include for the cost of boiler operators, supervisory staff, overheads and profit.

PFB - STEAM DISTRIBUTION INSTALLATION

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PFB 01 SCOPE

- (a) This specification covers the particulars of the repair and maintenance work to the steam distribution installation at the **Dcs: Ncome Prison**. This Particular Specification shall be read in conjunction with the Technical Specification FB: Steam Distribution Installations and all additional and technical specifications compiled as part of this document, in particular the following Additional Specifications:

SA: General Maintenance

SB: Operating and Maintenance Manuals

SC: General Decommissioning, Testing and Commissioning Procedures

The intended repair and maintenance work to this installation will restore the existing installation to a safe, efficiently functional system that complies with all statutory regulations and applicable standards, in the process repairing all defects and shortfalls. Maintenance responsibilities for each installation shall commence with access to the site. A difference shall be made in payment for maintenance prior to and after completion of repair work. The Departmental representative / Engineer shall instruct the contractor to conduct repair / maintenance work that is to be completed and maintained by the Contractor for the full duration of the 24-month Contract period.

- (b) The installations to be maintained under this Contract include the following:
- i. Steam and condensate distribution network on site;
 - ii. Condensate pump systems;
 - iii. Steam and condensate secondary piping systems to the following installations:
 - Laundry
 - Prison kitchens
 - Hot-water storage calorifier installations in boiler house.
 - Boiler plant room.
- NB: The above installations must be adjusted according to the site requirements.
- iv. Hot-water calorifier installations form part of Installation B. The maintenance responsibilities of hot-water calorifier installations shall form part of this installation. Reference must be made to Technical Specification FC.

PFB 02 GENERAL DESCRIPTION OF INSTALLATION

PFB 02.01 EXISTING INSTALLATION

The existing steam distribution network on site is reticulated by means of an overhead pipe system from the Central Boiler House, situated adjacent to the main kitchen, to the various steam consumer installations listed as follows.

- (a) Central laundry (should it be required)
- (b) Kitchen (should it be required)
- (c) Hot-water calorifier installations in the boiler house

NB: The above installations are site specific and must be adjusted accordingly.

PFB 02.02 CONDENSATE RETURN

From these installations and all the steam trap arrangements, a condensate return gravity installation is installed along the same route as the steam distribution network, leading both to the boiler feeder tank inside the boiler house.

PFB 02.03 ROUTING OF PIPEWORK

The routing of this steam distribution network is as follows:

- (a) From the boiler house to the prison kitchen supported from wall/pole brackets \pm 25 metres;
- (b) From the boiler house to the central laundry supported from wall/pole brackets \pm 30 metres;

PFB 03 TECHNICAL DETAILS OF EXISTING INSTALLATION

At the time of compilation of this document the existing installation consisted of the equipment and plant as listed below with their relevant technical details.

PFB 03.01 STEAM DISTRIBUTION PIPING

No.	Item	Technical Details
01.	Pipe material	Schedule 40 seamless steam piping
02.	Lagging and cladding	Fiberglass pre-formed sections with galvanized sheet metal muffs
03.	Pipe route distances	\pm 900 meters
04.	Supports	Galvanized post type pole supports and wall brackets with chain hangers.

PFB 03.02 CONDENSATE DISTRIBUTION PIPING

No.	Item	Technical Details
01.	Pipe material	Steel welded/flanged and Copper to SANS 460 with capillary solder fittings
02.	Lagging and cladding	Fiberglass pre-formed sections with galvanized sheet metal muffs
03.	Pipe route distances	\pm 900 meters
04.	Supports	From steam support posts and hangers from steam lines

PFB 03.03 STEAM TRAP ARRANGEMENTS

No.	Item	Technical Details
01.	Manufacturers	Armstrong & Spirax-Sarco
02.	Type	Inverted bucket & float thermostatic
03.	Model no	Various
04.	Size	15 & 20mm
05.	Total number installed	± 55

PFB 03.04 PRESSURE-REDUCING VALVES

No.	Item	Technical Details
01.	Manufacturers	Armstrong & Spirax-Sarco
02.	Type	External Pilot operated PRV
03.	Model no	Not available
04.	Size	40 mm dia
05.	Quantity	± 6
06.	Down steam pressure	100 kPa

PFB 03.05 CONDENSATE PUMP SYSTEMS

1. Prison Kitchen

No.	Item	Technical Details
01.	Type	Electrically driven pumps with condensate tank
02.	Pump Model no	TBA
03.	Pump manufacturer	Calpeda
04.	Pump motor	0.75 kW 3-phase 230 V 50 Hz
05.	Condensate tank size	TBA litre
06.	Number of tanks	1
07.	Number of pumps	2
08.	Electrical control panel	1

NB: The table above must be duplicated as required and the information in red must be

applicable to the equipment referred to in the table.

PFB 04 STATUS OF EXISTING INSTALLATION

At the time of compilation of this document the status of the existing installation has been noted as follows:

- (a) Some steam leaks exist on the distribution network.
- (b) The steam and condensate reticulation is generally in a good condition.
- (c) Some line trap sets on the distribution network discharge directly into the atmosphere.

NB: The above information must be adjusted according to the project and site requirements.

PFB 05 DETAILS OF REPAIR WORK

The following work shall form part of the repair work to the steam distribution installation. This work shall be done in accordance with the relevant regulations, codes, specifications and Technical Specification FB: Steam Distribution Installations, as set out in this document. The following work shall be included:

PFB 05.01 General

The Contractor shall at the start of the Repair and Maintenance Contract inspect the following items, systems, equipment, components and installations. This inspection shall include the establishing of any defects, leaks, conditions, damages, short falls, structural soundness, repairs required, details of existing equipment, suitability of equipment for the purpose it serves, etc. The Contractor shall report back to the Engineer/Departmental Representative in writing on all of the above and the following items. No repair work shall commence prior to approval by the Engineer/Departmental Representative:

- (a) Main and secondary steam and condensate pipe distribution network including all steam valves, expansion joints, pipe fittings, piping, air release valves, dirt pockets, etc;
- (b) Steam trap arrangements including steam traps, sight glasses, non-return valves, test valves, pipe connections, piping, etc;
- (c) Support and bracketing system to all steam and condensate pipe work;

- (d) Lagging and cladding of steam and condensate pipe work;
- (e) Pressure reducing valve installations;
- (f) Condensate pump installations.

The general scope of work at the time of going on tender is defined as follows:

- (a) Repair of all steam leaks;
- (b) The installation of blow-down valves and piping dirt pockets not equipped with blow-down valves.
- (c) Check, clean and repair condensate pump systems as required.
- (d) The servicing of all equipment including steam trap arrangements, PRV stations, valves, strainers, check-valves, pressure gauges, sight glasses, condensate pump system, control valves, safety valves, etc;
- (e) Flushing out of complete pipe system followed by a pressure test;
- (f) The Contractor shall allow for all required inspections and tests by an approved Inspection Authority on repair work where required by the Occupational Health and Safety Act as amended.
- (g) Preparation and painting of all exposed piping and equipment in accordance with the Department's painting specification;
- (h) The introduction of a maintenance control plan, including logging, recording and control procedures;
- (i) Handing over of complete system to the satisfaction of the Engineer/Departmental Representative on completion of the repair work on which the maintenance period of this contract shall commence.

PFB 05.02 DETAIL WORK

PFB 05.02.01 Steam and condensate pipe reticulation network - Refer to Standard Specification FB clause FB 09

- (a) Repair and replace damaged and missing sections of lagging and cladding to the steam and condensate pipe system as directed by the Engineer/Departmental representative. This shall include new fibre glass pre-formed sections and sheet metal muffs for short runs of piping and fittings. Rates will be as entered in the Schedule of Quantities.
- (b) Clean and blow out all dirt pockets.

- (c) Install 15 mm diameter steam globe valves with plugged end as required to existing plugged dirt pockets on the steam distribution installation. This shall include reducing bush nipples, valves and plugs. Quantities will be as specified in the Schedule of Quantities.
- (d) Clean, service, repair and replace sight glasses to all sight glass units. This shall include gaskets and new glasses.
- (e) Service all steam traps and replace all gaskets, O-rings, seals, strainer elements, buckets, thermostatic elements, valve assemblies, etc, as specified necessary for a full service on the specific steam traps. Quantities will be as specified in the Schedule of Quantities.
- (f) Replace damaged and defective steam traps beyond repair. Quantities will be as specified in the Schedule of Quantities.
- (g) Service, all steam and condensate valves and replace seals, gaskets, and gland packings. Quantities as specified in the Schedule of Quantities.
- (h) Repair steam leaks to steam piping. This shall include cutting, preparing, welding, cleaning, testing and all required fittings and making good of lagging and cladding.
- (i) Blow down all dirt pockets.

PFB 05.02.02 Steam and condensate pipe installation to the calorifier plant installation in the boiler house - Refer to Standard Specification FB clause FB 09

- (a) Decommission, disconnect and dismantle existing steam and condensate pipes to each calorifier in turn, check and repair steam trap sets to each calorifier as required and check for correct operation.
- (b) Service and repair steam and condensate valves and fittings
- (c) Clean, service and repair condensate sight glasses
- (d) Test, commission and hand over the complete steam and condensate steam installation.
- (e) Repair all steam leaks
- (f) Blow down and clean all dirt pockets/drain points
- (g) Repair all damaged lagging and cladding
- (h) Put systems back on line

PFB 05.02.03 Steam and condensate installation to the calorifier plant installations at the single quarters - Refer to Standard Specification FB clause FB 09

- (a) Decommission, disconnect and dismantle existing steam and condensate pipes to each calorifier in turn, check and repair steam trap sets to each calorifier as required and check for correct operation.
- (b) Service and repair steam and condensate valves and fittings
- (c) Clean, service and repair condensate sight glasses
- (d) Test, commission and hand over the complete steam and condensate steam installation.
- (e) Repair all steam leaks
- (f) Blow down and clean all dirt pockets/drain points
- (g) Repair all damaged lagging and cladding
- (h) Put systems back on line

PFB 05.02.04 Steam and condensate installation to laundry - Refer to Standard Specification FB clause FB 09

- (a) Service and repair all steam traps.
- (b) Service and repair safety valve to existing PRV installation.
- (c) Service and repair pressure reducing valves
- (d) Repair and service all steam and condensate valves.
- (e) Service, repair and clean condensate sight glasses
- (f) Blow down all dirt pockets.
- (g) Re-commission and put system back on line.

PFB 05.02.05 Steam and condensate installation to kitchen - Refer to Standard Specification FB clause FB 09

- (a) Service and repair pilot operated PRVs.
- (b) Service and repair all steam traps.
- (c) Service and repair all steam and condensate valves.
- (d) Service, repair and overhaul steam pop-up safety valve.

- (e) Clean out, service, repair sight glasses including replacement of glasses and gaskets.
- (f) Blow down all dirt pockets.
- (g) Re-commission and put system both into operation.

PFB 05.02.06 Condensate pump installations - Refer to Standard Specification FB clause FB 09

- (a) Inspect and report back to the Engineer/Departmental Representative in writing on the condition and status of all the condensate pump installations and their associated equipment.
- (b) Drain, empty, clean out and inspect all condensate tanks for any defects or damages, and report to the Engineer/Department Representative. The Engineer/Department Representative shall inspect these tanks prior to any further work or/and put back into operation.
- (c) Inspect, service, tests and report on the condition and functionality of all level controls.
- (d) Inspect, service and report on electrical condensate pumps including the following as described in FB 09.09.02.
- (e) Inspect, service, test and repair electrical control panels as described in FB 09.11.02.

PFB 05.03 PAINTING

The Contractor shall prepare, clean and paint all steel surfaces and equipment where directed by the Engineer in accordance with Specification OWG 371: Specification of Materials and Methods to be used (Fourth edition, October 1993 or latest edition).

(a) **Condensate Pumps**

Centrifugal pumps suitable for pumping hot, corrosive water are required for pumping condensate.

The required pump flow capacities and heads for each pump is 1.5 litres/sec at a head of approximately 20 - 25 metres.

It is essential that the following items of information be permanently marked on each pump:

- (i) flow capacity (l/sec);
- (ii) Pump head (meters water gauge);
- (iii) Impeller size;
- (iv) Pump speed;
- (v) Required motor power;
- (vi) Make of pump;
- (vii) Model;
- (viii) Date of purchase.

Close coupled pumps/motors are not acceptable.

It is preferred that separate pumps and motors be supplied, mounted on a common rigid steel or cast iron frame.

Pumps must have shrouded impellers and replaceable wear rings. Impellers must be made of bronze or stainless steel and pump shafts must be of type 410 or 415 stainless steel.

Pump glands must be fully accessible without having to remove the motor. Gland packing must be PTFE (Polytetrafluoroethylene) and be readily replaceable.

Pump bearings, if not of the permanently lubricated type must be lubricated from an oil reservoir with sufficient capacity for at least six months operation.

The pump drive and coupling must be protected by a sturdy drive guard.

Pumps must be selected to operate at maximum efficiency. Pump speeds must not exceed 1450 rpm and the installation must be a quiet in operation.

Pumps must be mounted on drip trays neatly piped to the nearest drain point.

Pressure gauges must be fitted to pump discharge pipes. The normal operating pressure must be clearly marked on the dial face.

(b) Motors

Electric motors for condensate pump sets must be suitable for duty at ambient temperatures up to 60°C. Motors must be of the totally enclosed, drip proof, fan cooled type with life-time sealed bearings. Furthermore they must comply with the relevant SANS specifications (Latest amendments).

Motor control will be by means of the float/level switch specified in section 6.3 which will activate a direct-on-line starter.

Unless otherwise specified a suitably rated electrical supply will be brought into close proximity of the pump motor by others. The steam Contractor will be required to supply a switchboard containing a suitably rated isolator, circuit breaker, the necessary direct-on-line starter, etc. The steam Contractor will be required to terminate the cable brought in by others in the isolator and make the necessary connections to the motor.

It is essential that the board contain a low voltage release that will isolate the pump on voltage drop below 90% of the rated voltage. A timer is required to delay re-starting of the pump for 2 - 3 minutes after full power is restored. Similarly phase failure protection is required, again with the motor only restarting 2 - 3 minutes after restoration of full power. In both instances the motor must restart automatically.

A manual-auto switch is required on the board in order that the float switch can be over-ridden and the pump checked for maintenance purposes.

All electrical wiring must be done in accordance with the requirements of SANS 10142 (latest edition & amendments).

PFB 06 DETAILS OF MAINTENANCE WORK

PFB 06.01 GENERAL

The Contractor shall be responsible for the complete maintenance of all the equipment, components, installations and systems forming part of this repair and maintenance contract for Installation B. The Contractor shall strictly adhere to General Maintenance, and Technical Specification FB: Steam Distribution Installations, with regard to the maintenance period, obligations, responsibilities, actions and activities, etc., which shall also include the following maintenance actions:

- (a) Routine preventative maintenance: A guideline to the required actions is provided in specification FB. The actions will not be limited to these guidelines, but shall include all additional actions, work, materials, etc, necessary to maintain this installation at an acceptable level.
- (b) Corrective maintenance as described in General Maintenance.
- (c) Breakdown maintenance as described in General Maintenance.

For this particular installation fatal breakdown shall be defined as no steam being available at all due to a failure of this system as a whole.

Emergency breakdown shall be defined as any other equipment, components, and systems preventing the provision of steam to the consumer points due to a failure of part of this system at the particular point of incident.

PFC - HOT-WATER GENERATING INSTALLATION

CONTENTS

PFC 01	SCOPE
PFC 02	GENERAL DESCRIPTION OF INSTALLATION
PFC 03	TECHNICAL DETAILS OF EXISTING INSTALLATION
PFC 04	STATUS OF EXISTING INSTALLATION
PFC 05	DETAILS OF REPAIR WORK
PFC 06	DETAILS OF MAINTENANCE WORK

PFC 01 SCOPE

- (a) This specification covers the particulars of the repair and maintenance work to the hot-water generating installation at the **DCS: Ncome Prison**. This Particular Specification shall be read in conjunction with the Technical Specification FC: Hot-water Generating Installations, and all additional and technical specifications compiled as part of this document, in particular the following Additional Specifications:

SA: General Maintenance

SB: Operating and Maintenance Manuals

SC: General Decommissioning, Testing and Commissioning Procedures

The intended repair and maintenance work to this installation will restore the existing installation to a safe, efficiently functional system that complies with all statutory regulations and applicable standards, in the process repairing all defects and shortfalls. Monthly maintenance responsibilities for each installation shall commence with access to the site. A difference shall be made in payment for maintenance prior to and after practical completion of repair work. The Departmental representative / Engineer shall instruct the contractor to conduct repair / maintenance work that is to be completed and maintained by the Contractor for the full duration of the 24-month Contract period.

- (b) The installations to be maintained under this Contract includes the following:
- (i) Storage calorifier installation in the Boiler House and various other installations;
 - (ii) All domestic water installations and equipment in the plant rooms;
 - (iii) All hot-water circulating pump sets;
 - (iv) Steam and condensate piping and equipment in the plant rooms;
 - (v) Electrical control equipment, wiring, cabling, panels and instrumentation associated with each installation.

PFC 02 GENERAL DESCRIPTION OF EXISTING INSTALLATION

The existing hot-water generating installations are situated in various plant rooms at the various prisons. These installations currently consist of storage calorifiers with steam heater batteries and a pipes distribution network from and to the storage calorifiers. These installations are equipped with in-line hot-water circulating pump sets. Steam is provided to the steam heater batteries by means of the steam distribution network on site.

These systems provide hot water for ablution facilities, consisting of wash-hand basins, wash troughs and showers to the following:

- (a) Main prison ± 10000 inmates
- (c) Boiler house also provides hot water to the central laundry and kitchen.

NB: The information in red above is site specific and should be adjusted accordingly.

The technical details of these installations are provided in section PFC 03.

PFC 03 TECHNICAL DETAILS OF EXISTING INSTALLATION

At the time of compilation of this document the existing installation consisted of the equipment and plant listed below with their relevant technical details.

PFC 03.01 TECHNICAL DETAILS: STORAGE CALORIFIERS

PFC 03.01.01 Various plant rooms on site positions on site

No.	Item	Technical Detail
01.	Storage capacity	5 000 / 2500 litres/vessels
02.	Number of vessels	11
03.	Steam heater banks	
	03.01. Manufacturer	
	03.02. Factory no	MTSB005
	03.03. Capacity	± 0.001 m ³ /heater bank
	03.04. Number of heater banks	1/vessel
	03.05. Steam W.P	700 kPa
	03.06 Steam T.P	1050 kPa
	03.07. Manufacturing date	2011
04.	Steam heating control valve	Horne 20 mm dia.
05.	Water pressure	±450 kPa

PFC 03.02 CIRCULATING PUMPS

PFC 03.02.01 Boiler House

No.	Item	Technical Detail
01.	Type	In-line canned motor HW circulating pump
02.	Number of pumps	2
03.	Manufacturer	TBA
04.	Model no.	TBA

PFC 04 STATUS OF EXISTING INSTALLATION

At the time of compilation of this document the status of the existing installations was noted as follows:

- (a) Boiler house installation:
 - (i) Generally in good condition
 - (ii) No condensate leaks
 - (iii) No water leaks from calorifiers
 - (iv) Circulating pump operational
 - (v) Lagging and cladding in good condition

PFC 05 DETAILS OF REPAIR WORK

The following work shall form part of the intended repair work to the hot-water generating installations. This work shall be done in accordance with the relevant regulations, codes, specifications and Technical Specification FC: Hot-water Generating Installations, as set out in this document. The following work shall be included:

PFC 05.01 GENERAL

The Contractor shall at the start of the contract inspect the items, systems, equipment, components and installations listed below. This inspection shall include the establishing of any defects, leaks, conditions, damages, shortfalls, structural soundness, repairs required, details of existing equipment, suitability of equipment for the purpose they serve, etc. The Contractor shall report to the Departmental Representative/Engineer in writing on all the above and the following items. No repair work shall commence prior to approval by the Departmental Representative/Engineer:

- a) Hot-water storage calorifiers, including lagging and cladding and steam heater batteries;
- b) Steam and condensate installation, including fittings, piping, valves, steam traps, lagging and cladding, etc.;
- c) Bracketing system;
- d) Heating control equipment and instrumentation;
- e) Hot-water circulating pump sets;
- f) Electrical control panel and wiring.

The general scope of work at the time of going to tender is defined as follows:

- a) The servicing of all hot-water storage calorifiers
- b) Preparation and painting of all exposed piping and equipment in accordance with the manufacturer's specification;
- c) The servicing, repair and where necessary replacing of existing hot-water circulating pumps to all the storage calorifier installations, including all related electrical work;
- d) Handing over of complete systems, to the satisfaction of the Departmental Representative/Engineer, on completion of the repair work on which the maintenance period shall commence;
- e) The supply and compilation of operating and maintenance manuals;
- f) The testing, adjusting and commissioning of all systems;
- g) The introduction of a maintenance control plan, including logging, recording and control procedures.

PFC 05.02 DETAIL WORK

PFC 05.02.01 Standby Hot Water Circulating Pumps

Additional hot water circulating pumps complete with inlet and outlet valves, strainers and non-return valves are required. They shall have flow rates adjustable up to 5 cubic meters/hour at heads up to 6 meters and be of an approved manufacturer.

The additional pumps are required as standby units to the existing pumps and allowance must be made for cutting into the existing hot water return piping supplying and installing the necessary piping, fittings, valves, etc. required to return the systems to full working condition.

PFC 05.03 PAINTING

The Contractor shall prepare, clean and paint all steel surfaces and equipment where directed by the Departmental Representative/Engineer in accordance with Specification OWG 371: Specification of Materials and Methods to be used (Fourth edition, October 1993 or latest version).

PFC 06.01 GENERAL

The Contractor shall be responsible for the complete maintenance of all the equipment, components, installations and systems forming part of this repair and maintenance contract for Installation C. The Contractor shall strictly adhere to General Maintenance, and Technical Specification FC: Hot-water Generating Installations, with regard to the maintenance period, obligations, responsibilities, actions and activities, etc, which shall also include the following maintenance actions:

- (a) Routine Preventative Maintenance. A guideline to the required actions is provided in specification FC. The actions will not be limited to these guidelines, but shall include all additional actions, work, materials, etc., necessary to maintain this installation at an acceptable level.
- (b) Corrective Maintenance as described and defined in General Maintenance.
- (c) Breakdown Maintenance as described and defined in General Maintenance.
- (d) For this particular installation no fatal breakdown is applicable.
- (e) Emergency breakdown shall be defined as no provision of hot water to the consumer points due to a failure of equipment, components and systems of this particular installation.

TECHNICAL DETAILS: BOILER(S)

BOILER TECHNICAL DETAILS		
1	Manufacturer	
2	Model no	
3	Boiler serial no	
4	Registration certificate no	
5	Boiler type	
6	Design code	
7	Factory no	
8	Manufacturing date/year	
9	Maximum continuous rating	
10	Design pressure rating	
11	Authorized working gauge pressure	
12	Normal operation pressure	
13	Safety blow-off pressure	
14	Test pressure	
15	FD fan model no	
16	FD fan power capacity	
17	Stoker Make & type	
18	Stoker pulling motor capacity	
19	Chain grade stoker	
19	ID fan power capacity	
20	Feed pump	
21	Feed pump power capacity	

22	Grit collector	
23	Chimney stack type	
24	Boiler control panel	
25	Level control	

SCHEDULE 1 – INSPECTION

1.1. CONSUMABLES AND BOILER INSPECTION

NOTE: VERY IMPORTANT FOR THE BOILER INSPECTION

The specification is for the preparation of the steam boiler on site at your Correctional Centers **FOR 6 monthly** external and internal examination by the inspector as required in terms of Occupational Health Safety act No 85 1993 as amended (Oct2009) and Pressure Equipment Regulations (PER).

For every **6 months** of boiler inspection (external) a comprehensive report is required, clearly communicating the state/condition of the boiler.

For every **12 months** boiler inspection (external) a **certificate of continuity** will be issued by accredited **Approved Inspection Authority (AIA)**.

For every **36 months** boiler inspection (internal & external), a **certificate of continuity** will be issued by the **accredited Approved Inspection Authority (AIA)**

TABLE 1 - CONSUMABLES AND BOILER INSPECTION					
ITEM	DESCRIPTION	Unit	Qty	Rate	Amount
1	Water treatment equipment				
	Water test report every month				
	Water softener				
1.1	Inspect, test, service, clean and re-commission water softener equipment. Including analyses feed water and recharge salt container with salt	As in when	12	R	R
2	Chemical dosing equipment				
2.1	Inspect, test, service, clean and re-commission chemical dosing equipment, including replacement of chemical solenoid dosing pump, analyse feed water and fill with the correct chemicals	As in when	12	R	R
3	Ash removal	Weekly		R n/a	R n/a
4	Maintenance work to boiler during statutory inspection				
	Subject to requirements of the relevant health and safety standard incorporated into these Regulation under 44 of the OHS Act , the user shall cause:				
	Every fire-tube steam generator to be subjected to an internal and external inspection every 12 months. By an approved inspection authority for in service inspection appointed by the user in writing.	Annual	1		

	The boiler certificate to be issued.				
4.1	Clean out and descale boiler	Boilers	1	R	R
4.2	Inspection of boiler water side and integral pipework	Boilers	1	R	R
4.3	Replace all manhole, hand hole, mud hole cover seal	Boilers	1	R	R
4.4	Check the full operation of blow down valve	Boilers	1	R	R
4.5	Replace all smoke box covers and door joint seals with new approved joint seal and insulation	Boilers	1	R	R
4.6	Check for full operation of water pump	Boilers	1	R	R
4.7	Check all safety valves for full operation	Boilers	1	R	R
4.8	Condition of refractories work (brick work all)	Boilers	1	R	R
4.9	Check the full operation of Main stop valve	Boilers	1	R	R
4.10	Check the full operation of ID and FD fans	Boilers	1	R	R
4.11	Check the full operation of control panel and drives	Boilers	1	R	R
4.12	Check the chimney stacks	Boilers	1	R	R
4.13	Co2 test with report	Boilers	1	R	R
4.14	Check the full operation of feed water and non-return valve	Boilers	1	R	R
4.15	Check the full operation screw conveyor and gearbox	Boilers	1	R	R
4.16	Upon conclusion of test the boiler shall be placed back on range and steamed. All boiler controls shall be tested and any leaks be repaired.	Boilers	1	R	R
SUBTOTAL (CARRIED TO SUMMARY)					R

1.2. SCHEDULE FOR BOILER SERVICES AND STATUTORY INSPECTIONS

ITEM	SCHEDULE FOR SERVICE OR INSPECTION	YEAR 1 RATE PER ITEM	YEAR 2 RATE PER ITEM	YEAR 3 RATE PER ITEM	TOTAL 1+2+3
BOILER SERVICES AND STATUTORY INSPECTION					
1	Water Treatment	R	R	R	R
2	Chemical Dosing Equipment	R	R	R	R
3	Ash Removal	R	R	R	R
4	Maintenance Work	R	R	R	R
TOTAL FOR YEAR 1 CARRIED TO SUMMARY SHEET (PAGE 202)					R

SCHEDULE 2 – SERVICE

2.1. PRICES FOR SERVICING

SEMI-ANNUAL SERVICES EQUIPMENT UNITS AT CORRECTIONAL SERVICES DEPARTMENT.

Note:

1. The description of the service required entails the following: The servicing of the units as per the attached checklist.
2. Prices for servicing include checking of equipment as stipulated in annexure A and must include labor, transport, consumables, minor and incidental repairs and all other overheads.
3. Prices are to be totaled and carried over to the summary page.

Description of property

1. Correctional Services: Prisons consist of hot water systems and incinerators.

The list below indicates the components or systems which require regular services.

ITEM NO	DESCRIPTION SERVICING	QTY	RATE PER SERVICE FOR EACH ITEM	YEAR 1 UNIT PRICE/ SERVICE ALLOW FOR 2 SERVICES	YEAR 2 UNIT PRICE/ SERVICE ALLOW FOR 4 SERVICES	YEAR 3 UNIT PRICE/ SERVICE ALLOW FOR 4 SERVICES	TOTAL AMOUNT Year 1+2+3
1	FD fan						
1.1	Motor 5.5 KW	01	R	R	R	R	R
1.2	Pulley	01	R	R	R	R	R
1.3	Impeller + balancing With certificate	01	R	R	R	R	R
1.4	Bearings	01	R	R	R	R	R
1.6	FD fan blades	01	R	R			
2	ID fan						
2.1	Motor fan 45 KW	01	R	R	R	R	R
2.2	Impeller + balancing With certificate	01	R	R	R	R	R
2.3	Bearings	01	R	R	R	R	R
2.4	V - belt	01	R	R	R	R	R
2.5	Main shaft	01	R	R	R	R	R
2.6	ID fan blades	01	R	R	R	R	R
	SUB TOTAL						R

ITEM NO	DESCRIPTION SERVICING	QTY	YEAR 1 UNIT PRICE/ SERVICE ALLOW FOR SERVICES	YEAR 2 UNIT PRICE/ SERVICE ALLOW FOR SERVICES	YEAR 3 UNIT PRICE/ SERVICE ALLOW FOR SERVICES	TOTAL AMOUNT YEAR 1+2+3
3	Chain grate stoker					
3.1	Main drive shaft c/w sprocket	01	R	R	R	R
3.2	Main worm wheel	01	R	R	R	R
3.3	Carbo frax block	01	R	R	R	R
3.4	Side seal	01	R	R	R	R
3.5	Rear side seal	01	R	R	R	R
3.6	Front side seal	01	R	R	R	R
3.7	Rear roller and shaft c/w	01	R	R	R	R
3.8	Stainless steel Wearing strips	01	R	R	R	R
3.9	Non Asbestos sealing rope	01	R	R	R	R
3.10	Guide vane	01	R	R	R	R
3.11	Motor 1.5 kw	01	R	R	R	R
3.12	Motor 2.5 kw	01	R	R	R	R
	SUB TOTAL					R

ITEM NO	DESCRIPTION SERVICING	QTY	RATE PER SERVICE FOR EACH ITEM	YEAR 1 UNIT PRICE/ SERVICE ALLOW FOR 2 SERVICES	YEAR 2 UNIT PRICE/ SERVICE ALLOW FOR 4 SERVICES	YEAR 3 UNIT PRICE/ SERVICE ALLOW FOR 4 SERVICES	TOTAL AMOUNT Year 1+2+3
7	Worm screw conveyor						
7.1	160mm x 18m pipe worm screw conveyor (two pieces)	01	R	R	R	R	R
7.2	160mm x 5m Cross worm screw conveyor	01	R	R	R	R	R
7.3	Complete motor 5.5 kw with gear box for (160mmx18m) worm screw	01	R	R	R	R	R
7.4	Complete motor 2.5 kw with gear box for (160mmx5m) Cross worm screw	01	R	R	R	R	R
8	Refractory work						
8.1	Secondary arch	01	R	R	R	R	R
8.2	Ignition arch	01	R	R	R	R	R
8.3	Bridge wall	01	R	R	R	R	R
8.4	Recast rear access door	01	R	R	R	R	R
	SUB TOTAL						R

ITEM NO	DESCRIPTION SERVICING	QTY	RATE PER SERVICE FOR EACH ITEM	YEAR 1 UNIT PRICE/ SERVICE ALLOW FOR 2 SERVICES	YEAR 2 UNIT PRICE/ SERVICE ALLOW FOR 4 SERVICES	YEAR 3 UNIT PRICE/ SERVICE ALLOW FOR 4 SERVICES	TOTAL AMOUNT Year 1+2+3
9	Valve approved By NDPW specification						
9.1	Blow down 50 mm	01	R	R	R	R	R
9.2	Angel crown 150 mm	01	R	R	R	R	R
9.3	Screw down non return 150 mm	01	R	R	R	R	R
9.4	Angle feed check 50 mm	01	R	R	R	R	R
9.5	Safety double spring loaded 100mm	01	R	R	R	R	R
9.6	Mobrey switch	01	R	R	R	R	R
9.7	Main valve 300mm	01	R	R	R	R	R
9.8	Sequencing 25mm	01	R	R	R	R	R
9.9	Stop valve 40 mm	01	R	R	R	R	R
9.10	Ball valve 20mm	01	R	R	R	R	R

10	Ball valve steam						
10.1	Ball valve 25-50mm	01	R	R	R	R	R
11	Check valve						
11.1	Check valve 20mm	01	R	R	R	R	R
11.2	Check valve 32mm	01	R	R	R	R	R
	SUB TOTAL						R

ITEM NO	DESCRIPTION SERVICING	QTY	RATE PER SERVICE FOR EACH ITEM	YEAR 1 UNIT PRICE/ SERVICE ALLOW FOR 2 SERVICES	YEAR 2 UNIT PRICE/ SERVICE ALLOW FOR 4 SERVICES	YEAR 3 UNIT PRICE/ SERVICE ALLOW FOR 4 SERVICES	TOTAL AMOUNT Year 1+2+3
12	Boiler feed pump						
12.1	Complete replacement water pump	01	R	R	R	R	R
12.2	Motor 7.5 kw	01	R	R	R	R	R
12.3	Motor 11 kw	01	R	R	R	R	R
12.4	6 stage Pump	01	R	R	R	R	R
13	Steam valve for the for following sizes						
13.1	15mm dia	01	R	R	R	R	R
13.2	20mm dia	01	R	R	R	R	R
13.3	50mm dia	01	R	R	R	R	R
13.4	80mm dia	01	R	R	R	R	R
13.5	100mm dia	01	R	R	R	R	R
13.6	150mm dia	01	R	R	R	R	R
	SUB TOTAL						R

ITEM NO	DESCRIPTION SERVICING	QTY	RATE PER SERVICE FOR EACH ITEM	YEAR 1 UNIT PRICE/ SERVICE ALLOW FOR 2 SERVICES	YEAR 2 UNIT PRICE/ SERVICE ALLOW FOR 4 SERVICES	YEAR 3 UNIT PRICE/ SERVICE ALLOW FOR 4 SERVICES	TOTAL AMOUNT Year 1+2+3
14	Calorifiers						
14.1	Heating battery with two coil	01	R	R	R	R	R
14.2	Home valve 20mm	01	R	R	R	R	R
14.3	Set of steam trap 20mm as per DPW spec	01	R	R	R	R	R
14.4	Safety valve 32mm	01	R	R	R	R	R
14.5	Temperature (0-120) 10mm	01	R	R	R	R	R
14.6	Pressure gauge (0_1600)10mm	01	R	R	R	R	R
14.7	Home thermostatic temp control valve (25-150°C)	01	R	R	R	R	R
14.8	Steam valve 25mm	01	R	R	R	R	R
14.9	Circulating pump 25mm (28-48) watts 0.21A	01	R	R	R	R	R
14.10	Sight glass 15mm	01	R	R	R	R	R
14.11	Sight glass 20mm	01	R	R	R	R	R
	SUB TOTAL						R

ITEM NO	DESCRIPTION SERVICING	QTY	RATE PER SERVICE FOR EACH ITEM	YEAR 1 UNIT PRICE/ SERVICE ALLOW FOR 2 SERVICE S	YEAR 2 UNIT PRICE/ SERVICE ALLOW FOR 4 SERVICES	YEAR 3 UNIT PRICE/ SERVICE ALLOW FOR 4 SERVICES	TOTAL AMOUNT Year 1+2+3
15	Strainers						
15.1	Strainer 32 mm	01	R	R	R	R	R
15.2	Strainer 40 mm	01	R	R	R	R	R
16	Copper pipe class two						
16.1	Copper pipe 15 mm	p/m	R	R	R	R	R
16.2	Copper pipe 32 mm	p/m	R	R	R	R	R
17	Boiler tubes						
17.1	Replace one boiler tube	01	R	R	R	R	R
18	Pressure reducing valve station						
18.1	PRV 25 mm	01	R	R	R	R	R
18.2	PRV 32 mm	01	R	R	R	R	R
18.3	PRV 40 mm	01	R	R	R	R	R
19	Grundfos						
19.1	CRS pump for condensate extraction	01	R	R	R	R	R
	SUB TOTAL						R

ITEM NO	DESCRIPTION SERVICING	QTY	RATE PER SERVICE FOR EACH ITEM	YEAR 1 UNIT PRICE/ SERVICE ALLOW FOR 2 SERVICES	YEAR 2 UNIT PRICE/ SERVICE ALLOW FOR 4 SERVICES	YEAR 3 UNIT PRICE/ SERVICE ALLOW FOR 4 SERVICES	TOTAL AMOUNT Year 1+2+3
20	Paints work						
20.1	Chimney silver with resistance paint	03	R	R	R	R	R
20.2	Boiler house floor with green paint 300 m ² (floor paint)	01	R	R	R	R	R
20.3	Lines around the boilers with yellow paint 120m x 75mm(road making paint)	01	R	R	R	R	R
20.4	Steps to the boiler with red and road making paint)	01	R	R	R	R	R
	SUB TOTAL						
TOTAL FOR YEAR 1 CARRIED TO SUMMARY SHEET (PAGE 202)							R

SCHEDULE 3 – REPAIRS AND MAINTENANCE

SCHEDULE FOR REPAIRS AND MAINTENANCE SCHEDULE FOR BOILERS

Note:-

1. The description of the service required entails the following: The repairs of the units as per the attached
2. Prices for servicing include checking of equipment and topping of gas or oil when its' low as stipulated in annexure A must, include, labor, transport, consumables, minor and incidental repairs and all other overheads.
3. Prices are to be multiplied by quantities and calculated in totals and all totals be carried over to the summary page.

Description of property

4. Department of Correctional Service.
5. The list below indicates the complexes which require regular services.

SCHEDULE 3.1.: THE REPLACEMENT PARTS FOR THE BOILER AND ALL STEAM RELATED GENERATION COMPONENTS

**Provide costs which include supply, installation and commissioning
All equipment/accessories/fittings must be in accordance with DPW specifications, unless stated otherwise.**

SCHEDULE 3.1.: THE REPLACEMENT PARTS FOR COAL FIRED BOILER AND ALL STEAM RELATED GENERATION COMPONENTS

Item	Description	Unit	Qty	Rate	Year 1	Year 2	Year 3	Total Amount Year 1+2+3
	MAJOR EQUIPMENT		1					
1.	Forced Draft (FD) Fan in accordance with John Thompson specifications, complete with:		1	R	R	R	R	R
1.1.	- 5.50 kW Motor		1	R	R	R	R	R
1,02	- Pulley		1	R	R	R	R	R
1,03	- Impeller + balancing with certificate of compliance		1	R	R	R	R	R
1,04	- Bearings		1	R	R	R	R	R
1,05	- FD fan blades		1	R	R	R	R	R
2,00	Induced Draft (ID) Fan in accordance with Mitchell Cotts specifications, complete with:		1	R	R	R	R	R
2,01	- 45.0 kW Motor		1	R	R	R	R	R
2,02	- Impeller + balancing with certificate of compliance		1	R	R	R	R	R
2,03	- Bearings		1	R	R	R	R	R

2,04	- V - belt		1	R	R	R	R	R
2,05	- Main shaft		1	R	R	R	R	R
2,06	- ID fan blades		1	R	R	R	R	R
3,00	Chain grate stoker, complete with:		1	R	R	R	R	R
3,01	- Main drive shaft c/w sprocket		1	R	R	R	R	R
3,02	- Main worm wheel		1	R	R	R	R	R
3,03	- Carbo frax block		1	R	R	R	R	R
3,04	- Side seal		1	R	R	R	R	R
3,05	- Rear side seal		1	R	R	R	R	R
3,06	- Front side seal		1	R	R	R	R	R
	SUB-TOTAL							R

3,07	- Rear roller and shaft c/w stainless steel and wearing strips		1	R	R	R	R	R
3,08	- Non Asbestos sealing rope		1	R	R	R	R	R
3,09	- Guide vane		1	R	R	R	R	R
3,10	- 1.5 kW Motor		1	R	R	R	R	R
3,11	- 2.5 kW Motor		1	R	R	R	R	R
4,00	Coal feed section, complete with:		1	R	R	R	R	R
4,01	- Coal hopper		1	R	R	R	R	R
4,02	- Worm wheel operating shaft		1	R	R	R	R	R
4,03	- Guillotine door		1	R	R	R	R	R
4,04	- Hopper support		1	R	R	R	R	R

4,05	- Lifting mechanism shaft complete		1	R	R	R	R	R
4,06	- Guillotine door support cable		1	R	R	R	R	R
SUB - TOTAL								R

Item	Description	Unit	Qty	Rate	Year 1	Year 2	Year 3	Total Amount Year 1+2+3
	Major equipment		1	R	R	R	R	R
5.	Boiler feed pump, complete with:		1	R	R	R	R	R
5.1.	- Water pump replacement		1	R	R	R	R	R
5.2.	- 7.5Kw Motor		1	R	R	R	R	R
5.3.	- 11kW Motor		1	R	R	R	R	R
5.4.	- 6 stage Pump		1	R	R	R	R	R
6.	Stocker drive, complete with:		1	R	R	R	R	R
6.1.	- 5.5kW Motor		1	R	R	R	R	R
6.2.	- Gear box motor		1	R	R	R	R	R
6.3.	- 1 292mm wide chain grate mat 0.5 m		1	R	R	R	R	R
7.	Worm screw conveyor, complete with:		1	R	R	R	R	R
7.1.	- 160mm x 18m pipe worm screw conveyor		1	R	R	R	R	R
7.2.	- 160mm x 5m Cross worm screw conveyor		1	R	R	R	R	R
7.3.	- 5.5 kW Motor c/w gear box for (160mmx18m) worm screw		1	R	R	R	R	R
7.4.	- 2.5 kW Motor c/w gear box for (160mmx5m) cross work screw		1	R	R	R	R	R
8.	Grundfos , complete with:		1	R	R	R	R	R
8.1.	- CRS pump for condensate extraction		1	R	R	R	R	R

9.	Refectory work, complete with:		1	R	R	R	R	R
9.1.	- Secondary arch		1	R	R	R	R	R
9.2.	- Ignition arch		1	R	R	R	R	R
9.3.	- Bridge wall		1	R	R	R	R	R
9.5.	- Recast rear access door		1	R	R	R	R	R
SUB-TOTAL								R
10.	Calorifiers, complete with:		1	R	R	R	R	R
10.1.	- Heating battery with two coils		1	R	R	R	R	R
10.2.	- Horne valve 20mm		1	R	R	R	R	R
10.3.	- Set of steam trap 20mm as per DPW specifications		1	R	R	R	R	R
10.4.	- Safety valve 32mm		1	R	R	R	R	R
10.5.	- Temperature (0-120) 10mm		1	R	R	R	R	R
10.6.	- Pressure gauge (0_1600)10mm		1	R	R	R	R	R
10.7.	- Horne thermostatic temp control valve (25- 150°C)		1	R	R	R	R	R
10.8.	- Steam valve 25mm		1	R	R	R	R	R
10.9.	- Circulating pump 25mm (28-48) watts 0.21A		1	R	R	R	R	R
10.1 0.	- Sight glass 15mm		1	R	R	R	R	R
10.1 1	- Sight glass 20mm		1	R	R	R	R	R
SUB-TOTAL								R

Item	Description	Unit	Qty	Rate	Year 1	Year 2	Year 3	Total Amount Year 1+2+3
	Fittings, accessories and piping		1	R	R	R	R	R
11.	ID and FD fan control unit, complete with:		1	R	R	R	R	R
11.1.	- Single knob combustion		1	R	R	R	R	R
11.2.	- ID damper control		1	R	R	R	R	R
12.	Boiler tubes		1					
12.1	- Replace boiler tubes which have exceeded service life/damaged		1	R	R	R	R	R
13.	Strainers		1	R	R	R	R	R
13.1.	- Strainer 32mm		1	R	R	R	R	R
13.2.	- Strainer 40mm		1	R	R	R	R	R
14.	Copper pipe class two		1	R	R	R	R	R
14.1.	- Copper pipe 15 mm		1	R	R	R	R	R
14.2.	- Copper pipe 32 mm		1	R	R	R	R	R
15.	Replacing with new steam trap set		1	R	R	R	R	R
15.1.	- 15mm dia		1	R	R	R	R	R
15.2.	- 20mm dia		1	R	R	R	R	R
15.3.	- 25mm dia		1	R	R	R	R	R

16.	Replacing with new expansion joints		1	R	R	R	R	R
16.1.	- 65mm dia		1	R	R	R	R	R
16.2.	- 80mm dia		1	R	R	R	R	R
16.3.	- 100mm dia		1	R	R	R	R	R
16.4.	- 200mm dia		1	R	R	R	R	R
	SUB-TOTAL							R

17.	Reducing socket steam		1	R	R	R	R	R
17.1.	- Socket 8x12 – 8x25 mm		1	R	R	R	R	R
17.2.	- Socket 32x15 –32x25 mm		1	R	R	R	R	R
17.3.	- Socket 40x15 –40x32 mm		1	R	R	R	R	R
17.4.	- Socket 50x15 –50x40 mm		1	R	R	R	R	R
17.5.	- Socket 80x20 –80x65mm		1	R	R	R	R	R
17.6.	- Socket 100x40 – 100x80mm		1	R	R	R	R	R
	Replacing lagging cladding to the steam pipe with the following pipe sizes:							
18.	- 15mm dia x 25mm		1	R	R	R	R	R
18.1.	- 20mm dia x 25mm		1	R	R	R	R	R
18.2.	- 32mm dia x 25mm		1	R	R	R	R	R
18.3.	- 65mm dia x 25mm		1	R	R	R	R	R
18.4.	- 100 mm dia x 40 mm		1	R	R	R	R	R
19.	Replacing brackets for the following pipes		1	R	R	R	R	R
19.1.	- 15 to 50mm dia		1	R	R	R	R	R
19.2.	- 65 to 80mm dia		1	R	R	R	R	R

19.3.	- 100 to 150mm dia		1	R	R	R	R	R
20.	Reducing tees steam		1	R	R	R	R	R
20.1.	- Tees 8x6-15x8mm		1	R	R	R	R	R
20.2.	- Tees 20x8 - 20x15mm		1	R	R	R	R	R
20.3.	- Tees 25x8-25x20 mm		1	R	R	R	R	R
20.4.	- Tees 32x15-32x25mm		1	R	R	R	R	R
20.5.	- Tees 40x15-40x32mm		1	R	R	R	R	R
20.6.	- Tees 50x15-50x40mm		1	R	R	R	R	R
20.7.	- Tees 65x15-65x50mm		1	R	R	R	R	R
	SUB-TOTAL							R

20.8.	- Tees 80x20-80x65mm		1	R	R	R	R	R
20.9.	- Tees(W/O) 100x40-100x80mm		1	R	R	R	R	R
21.	Bends 90 deg steam		1	R	R	R	R	R
21.1.	- Bends 6 -10mm		1	R	R	R	R	R
21.2.	- Bends 15-32mm		1	R	R	R	R	R
21.3.	- Bends 40-80mm		1	R	R	R	R	R
21.4.	- Bends W/O 100-150mm		1	R	R	R	R	R
22.	Nipples steam fitting (w/o)		1	R	R	R	R	R
22.1.	- Nipples 6-10mm		1	R	R	R	R	R
22.2.	- Nipples 15-32mm		1	R	R	R	R	R
22.3.	- Nipples 40-80mm			R	R	R	R	R
23.	Unions fitting		1	R	R	R	R	R
23.1.	- Union 12 mm		1	R	R	R	R	R
23.2.	- Union 15-32 mm		1	R	R	R	R	R
23.3.	- Union 40-80 mm		1	R	R	R	R	R
24.	Steam fitting screwed sockets		1	R	R	R	R	R
24.1.	- Socket 6 -10 mm		1	R	R	R	R	R
24.2.	- Socket 15 -32 mm		1	R	R	R	R	R
24.3.	- Socket 40 -80 mm		1	R	R	R	R	R

24.4.	- Socket 100 - 150mm		1	R	R	R	R	R
25.	Elbows 90 deg screwed		1	R	R	R	R	R
25.1.	- Elbows 6 -10 mm		1	R	R	R	R	R
25.2.	- Elbows 15 - 32mm		1	R	R	R	R	R
25.3.	- Elbows 40 - 80mm		1	R	R	R	R	R
25.4.	- Elbows (W/O) 100 -150mm		1	R	R	R	R	R
	SUB-TOTAL							R

	Valves, complete with:		1	R	R	R	R	R
26.	- Blow down 50mm		1	R	R	R	R	R
26.1.	- Angel crown 150mm		1	R	R	R	R	R
26.2.	- Screw down non return 150mm		1	R	R	R	R	R
26.3.	- Angle feed check 50mm		1	R	R	R	R	R
26.4.	- Safety double spring loaded 100mm		1	R	R	R	R	R
26.5.	- Mobrey switch		1	R	R	R	R	R
26.6.	- Main valve 300mm		1	R	R	R	R	R
26.7.	- Sequencing 25mm		1	R	R	R	R	R
26.8.	- Stop valve 40mm		1	R	R	R	R	R
27.	Ball valve steam		1	R	R	R	R	R
27.1.	- Ball valve 20mm		1	R	R	R	R	R
27.2.	- Ball valve 25-50mm		1	R	R	R	R	R
28.	Check valve		1	R	R	R	R	R
28.1.	- Check valve 20mm		1	R	R	R	R	R
28.2.	- Check valve 32mm		1	R	R	R	R	R
29.	Pressure reducing valve station		1	R	R	R	R	R
29.1.	- PRV 25 mm		1	R	R	R	R	R
29.2.	- PRV 32 mm		1	R	R	R	R	R
29.3.	- PRV 40 mm		1	R	R	R	R	R
30.	Steam valve		1	R	R	R	R	R
30.1.	- 15mm dia		1	R	R	R	R	R
30.2.	- 20mm dia		1	R	R	R	R	R
30.3.	- 50mm dia		1	R	R	R	R	R
30.4.	- 80mm dia		1	R	R	R	R	R

30.5.	- 100mm dia		1	R	R	R	R	R
30.6.	- 150mm dia		1	R	R	R	R	R
	SUB-TOTAL							R
Item	Description	Unit	Qty	Rate	Year 1	Year 2	Year 3	Total Amount Year 1+2+3
31.	ELECTRICAL PARTS		1	R	R	R	R	R
31.1	- 2.5mm- x 5 core cable swa p/m		1	R	R	R	R	R
31.2.	- 10mm ² - x 4core cable swa p/m		1	R	R	R	R	R
31.3.	- 16mm ² - x 4core cable swa p/m		1	R	R	R	R	R
31.4.	- Alarm		1	R	R	R	R	R
31.5.	- High pressure switch		1	R	R	R	R	R
31.6.	- Electronic ID (JH) control box (C/P)		1	R	R	R	R	R
31.7.	- Electronic FD (JH) control box (C/P)		1	R	R	R	R	R
31.8.	- T/P C/B10 amps		1	R	R	R	R	R
31.9.	- T/P C/B 20 amps		1	R	R	R	R	R
31.1 0.	- T/P C/B 30 amps		1	R	R	R	R	R
31.1 1.	- Contactor 380 volts		1	R	R	R	R	R
31.1 2.	- Contactor 220 volts		1	R	R	R	R	R
31.1 3.	- Probes hot water tank control		1	R	R	R	R	R
32.	Over load							
32.1.	- 16A – 22A relay		1	R	R	R	R	R

32.2.	- 30A – 55A relay		1	R	R	R	R	R
32.3.	- 88A – 125A relay		1	R	R	R	R	R
32.4.	- 150 watts bulbs 220 volts		1	R	R	R	R	R
32.5.	- Florescent fitting 1.2m complete		1	R	R	R	R	R
32.6.	- Single contact Bulbs 12 volts		1	R	R	R	R	R
SUB-TOTAL								R

33.	PAINT WORK			R	R	R	R	R
33.1.	- Chimney silver with resistance paint		1	R	R	R	R	R
33.2.	- Boiler house floor with green paint 300 m ² (floor paint)		1	R	R	R	R	R
33.3.	- Lines around the boilers with yellow paint 120m x 75mm(road making paint)		1	R	R	R	R	R
33.4.	- Steps to the boiler with red and road making paint)		1	R	R	R	R	R
TOTAL FOR YEAR 1 CARRIED TO SUMMARY SHEET (PAGE 202)								R

SCHEDULE 4 – TRANSPORT

SCHEDULE 4: SCHEDULE FOR TRANSPORT						
4	TRANSPORT COST FOR CONTRACT RELATED TRAVELLINGS	UNIT	Year 1	YEAR 2	YEAR 3	AMOUNT (RANDS) Year (1+2+3)
4.1	Transport cost of a vehicle with a loading capacity of 1 ton	Price/km As per the jurisdiction	R /km	R /km	R /km	R
4.2	Transport cost of a vehicle with a loading capacity of 2 ton	Price/km As per the jurisdiction	R /km	R /km	R /km	R
TOTAL FOR YEAR 1 CARRIED TO SUMMARY SHEET (PAGE 202)						R

Note:

1. The costs of workers and drivers traveling time shall be deemed to be included with the unit rates for transport costs
 2. All distances traveled will be measured from the Client Department to Source of Material/Suppliers.
 3. The map showing the jurisdiction for the relevant region should be attached. And the kilometers should be calculated for the return journey.
 4. Vehicle specifications such as engine capacity, and proof of a valid service plan should be produced if requested.
-
1. For hired vehicles it should be noted that the distances are still calculated from Client Department to Source of Material/Suppliers.
 2. The Department shall not be responsible for any damages that may occur on the vehicle, but the driver or the party that authorized the vehicle to be used.

SCHEDULE 5 - LABOUR AND MATERIAL

SCHEDULE 5: RATES FOR LABOUR AND MATERIAL							
		Qty	Year 1 (Rate)	Amount Year 1 (Rate*Qty)	Amount Year 2 (Rate*Qty)	Amount Year 3 (Rate*Qty)	Total amount (year 1+year 2+year 3)
1.	Labour for all boiler operations and Maintenance.						
1.1.	The rates for labor will be deemed to include for statutory Inspection (AIA) minimum labor rates, contribution to bonus, holiday, pension, medical funds etc., for normal working hours, as well as for transport costs including traveling time, but excluding VAT	Annual	R	R	R	R	R
1.2.	Boiler operation 24 hours per day for the period of 36 months. It is the Bidder responsibility to ensure that operators (3 * supervisor ,Safety Officer, Operator and Assistant) are available per shift	12 Months	R	R	R	R	R

						Amount Year 1 (Rate*Qty)	Amount Year 2 (Rate*Qty)	Amount Year 3 (Rate*Qty)	Total amount (year 1+year 2+year 3)
2.	Working hours(per hour) Repairs	QTY	Rate / hour						
2.1.	Boiler Operator	06	R	R					R
2.2	Boiler Assistant	06	R	R					
2.3.	Plant Supervisor	01	R	R					R
2.4	Safety Officer	01	R	R					
3.	Schedule materials				Rate/month				
	Water Softener & Salt	12 Months	R	R					R
4.	Percentage mark- up on schedule materials that may be used. (Percentage %)	20%		R					R
	TOTAL FOR YEAR 1 CARRIED TO SUMMARY SHEET (PAGE 202)								R

SUMMARY PAGE

BID FOR MAINTENANCE, REPAIRS AND OPERATION TO BOILERS AND ALL STEAM RELATED GENERATION COMPONENTS FOR THE PERIOD OF 36 MONTHS TERM CONTRACT.

The total tender price for this service must include all labor and material required for the proper execution of the work and shall be carried over to the Tender Form which must be returned together with this document.

No.	SCHEDULE DESCRIPTION	AMOUNT (RANDS)
1.	Schedule 1: Boiler Inspection	R
2.	Schedule 2: Service	R
3.	Schedule 3: Repair	R
4.	Schedule 4: Transport	R
5.	Schedule 5: Labour and Material	R
	Sub total	R
	Value Added Tax (VAT)	R
Year 1 total to be Carried Forward to Form of Offer and Acceptance (DPW-07) in line with CIDB Grade advertised		Total R

TENDERER'S SIGNATURE:

ADDRESS:

DATE:

PRICED SPECIFICATION:

A priced specification must be submitted with the tender documents.

NB* Schedule 1, 2, 3, 4 & 5 for year 1 **only** to be included to the form of offer and acceptance (DPW 07 EC).

ANNEXURE

ANNEXURE A: PREVENTATIVE MAINTENANCE SERVICE SCHEDULES

BID FOR NAPIERVILLE CORRECTIONAL SERVICES MAINTENANCE, REPAIRS AND OPERATION TO BOILERS AND ALL STEAM RELATED GENERATION COMPONENTS FOR THE PERIOD OF 24 MONTHS

Table A1: Period Boiler Inspection Schedule (Steam and Hot water)

Daily	Frequency				Recommended test	Accomplished By		
	Weekly	Monthly	Quarterly	Yearly		Boiler Operator	Service Technician	Checked
X					Look around the machine and check for leaks around the boiler	X		
X					Read the boiler's gauge and check results against owners manual's	X		
X					Listen for noises that are out of the ordinary for the machine	X		
X					Ensure that the machine is running smoothly without extra vibrations	X		
X					Check to ensure the combustion air opening is unobstructed	X		
X					Check pressure and/or temperature readings to ensure they are within the design range	X		
X					Check feed-water and condensate pumps for proper operation	X		

X				and leaky packing				X
X				Examine traps, check all valves(boiler drain valve, steam valve etc.), expansion tank or condensate tank and other parts of the system				X
X				Check the condition of the chain grate stocker/ coal screw				X
X				Check the mobrey valve float is operational				X
X				Check the hourly log book and compare results from previous day				X
X				Check condition of the exhausted through the chimney and report any fugitive emissions.				X

Frequency				Recommended test	Accomplished By			
Daily	Weekly	Monthly	Quarterly		Yearly	Boiler Operator	Service Technician	Checked
X				Check coal soot blower if it is clean or dirty				X
X				Check the rate at which the CO ₂ is exhausted				X
X				Check dirt and cladding				X
X				Check the delivery pressure (hot or warm water)				X
X				Check the steam pressure to the calorifier and the warm water temperature from the calorifier.				X
X				Check the hot water circulation pumps				X
X				Check the condition of the gearbox which controls the stoker				X
X				Check the rate at which the coal is delivered into the boiler				X

X				Check the type of coal if it's within the specification as stated by the department.	X
X				Observe condition of the flame	X
X				Check all relief valves for any leaks	X
X				Check water level control	X
X				Inspect boiler for air leaks. Check damper seals	X
X				Inspect all linkages on combustion air dampers and fuel valves	X
X				Check pilot and burner assemble. Clean pilot and burner following manufacture's guidelines. Examine for mineral or corrosion buildup	X

Frequency				Recommended test	Accomplished By			
Daily	Weekly	Monthly	Quarterly		Yearly	Boiler Operator	Service Technician	Checked
	X				X			
		X				X		
		X				X		
		X				X		

X	Measure and compare last month's readings flue gas composition over entire firing range	X
X	Inspect all boiler insulation and casing for hot spots.	X
X	Check combustion air intake to boiler room and boiler to make sure openings are adequate and clean	X
X	Check V-belts for proper tension. Check packing glands for compression leakage	X
X	Check pressure gauge, pump, filters and transfer lines. Clean filters as required	X
X	Check for air leaks around access openings and flame scanner assembly	X
X	Check all blower belts for tightness and minimum slippage	X
X	Check all gaskets for tight sealing, replace if do not provide tight seal	X
X	Perform water quality test for proper chemical balance.	X
X	Check for proper operation valves (Pressure reducing/regulating)	X
X	Thoroughly inspect heating system and address any problems	X
X	Inspect and clean the boiler heat exchanger	X

Frequency				Recommended test	Accomplished By			
Daily	Weekly	Monthly	Quarterly		Yearly	Boiler Operator	Service Technician	Checked
				X	Check bracket and the lagging on steam delivery pipes	X		
				X	Check all boiler wiring and connections	X	X	
				X	Inspect condensate system and clean and flush as necessary	X		
				X	Check water PH level	X		
				X	Inspect condensate system and clean and flush as necessary	X		
				X	Inspect and clean burner assembly	X		
				X	Inspect venting system for blockage, corrosion or deterioration and ensure all joint and pipe connections are tight	X		
				X	Inspect air inlet and vent terminations to ensure they are clear and unobstructed	X		
				X	Check control setting and test operating and safety controls	X		
			X		Check oil preheaters by removing the heating element and inspect for sludge or scale	X		
			X		Repair refractory. Immediately upon opening the fireside, give the refractories an inspection and repair necessary	X	X	
			X		Check pump coupling alignment. Check alignment to ensure the tolerance are within the manufactures recommendations	X		
			X		Reset combustion. The entire combustion process should be	X		

		Frequency				carefully checked, Oxygen readings taken and necessary burner adjustment made	Accomplished By			
		Daily	Weekly	Monthly	Quarterly		Yearly	Boiler Operator	Service Technician	Checked
					X	Recommended test				
						Inspect mercury switches. Inspect mercury switches for contamination, loss of mercury, and crack or broken wires. Replace if necessary				
				X		Check for proper boiler operation after it has been cleaned and inspected		X		
				X		Check if tubes are blocked and if so clean them as part of the shutdown procedure			X	
				X		Clean water side surface by following manufacture's recommendation on cleaning and preparing water side surface			X	
				X		Clean fire side by following the manufacture's recommendation on cleaning and preparing fire side surface			X	
				X		Inspect and repair refractories on the fire side. Use recommended material and procedures				X
				X		Remove and recondition or replace relief valve depending on their condition		X		
				X		Clean and recondition feed-water pumps. Clean condensate receivers and deaeration system		X		
				X		Check operation and repair any hydraulic and pneumatic valves		X		
				X		Conduct Eddy current test in order to assess tube wall thickness				X

			X	Clean all electrical terminals. Check electronics controls and replace any defective parts		X
--	--	--	---	--	--	---

NOTE: All minor and incidental repairs such as the replacement of nuts, bolts, washers, and self-tapping screws, pop rivets etc. shall form part of the service. The Contractor shall allow for such repairs, (material and labor cost), in his price for servicing.

REMARKS:

NOTE:

All minor and incidental repairs such as the replacement of nuts, bolts, washers, self-tapping screws, pop rivets etc. shall form part of the service. The Contractor shall allow for such repairs, (material and labor cost), in his price for servicing.

Artisan Sign-off: Name:	Date
Superintendent Sign-off: Name:	Date

Client Department Sign-off: Name:	Date

STAMP

ANNEXURE B: JOB CARD

MUST BE DETAILED, COMPLETED AND SUBMITTED WITH INVOICE

COMPLAINT NO: _____

1. BUILDING: _____ DEPARTMENT: _____ ORDER NO: _____

COMPLAINT: _____

REPORTED BY: NAME: _____ TELEPHONE: _____ DATE: _____

CONTRACTOR: _____ AREA: _____

DESCRIPTION OF WORK	PAGE & SCHEDULE NO:	QUANTITY IN WORDS	RATE		TOTAL	
			R	c	R	c
NON-SCHEDULE ITEMS TOTAL						
.....% PROFIT ON NON-SCHEDULE ITEMS						
SCHEDULE ITEMS TOTAL						
SCHEDULE AND NON-SCHEDULE ITEMS TOTAL						

2. WORK EXECUTED NB: UNUSED LINES MUST BE CANCELED BEFORE CERTIFYING

LABOUR NON-SCHEDULE ITEMS	FROM	TO	HOURS	RATE		TOTAL	
				R	c	R	c
ARTISAN							
LABOURER							
TRANSPORT COST	FROM ----TO	PAGE & SCHEDULE NO:	KILOMETERS				
LABOUR & TRANSPORT TOTAL							
SCHEDULE AND NON-SCHEDULE ITEMS TOTAL							
TOTAL							
VAT							
GRAND TOTAL							

ARTISAN'S NAME: _____

REMARKS

3. THIS PORTION MUST BE COMPLETED BY THE COMPLAINANT/DESIGNATED OFFICER OF THE CLIENT DEPARTMENT

I CERTIFY THAT I PERSONALLY CHECKED AND AM SATISFIED THAT THE WORK HAS BEEN EXECUTED SATISFACTORILY. I HAVE RECEIVED THE SCRAP MATERIAL. (HOWEVER, I DO NOT CERTIFY THE TECHNICAL CORRECTNESS)

NAME: _____ TELEPHONE NUMBER: _____

DESIGNATION: _____ SIGNATURE: _____ DATE: _____



RETAIN COPY FOR AUDIT PURPOSES

4.1

FOR DEPARTEMENTAL USE (DPW)

<input type="checkbox"/>	State
<input type="checkbox"/>	Hire
<input type="checkbox"/>	Inspection
<input type="checkbox"/>	Telephonic confirmation by: _____
	Number: _____

4.2

FOR DEPARTEMENTAL USE (DPW)

The work has been done

Signature: _____

Name: _____

Designation: _____

Date: _____

ANNEXURE C: PLANNED JOB OBSERVATION TEMPLATE

PLANNED JOB OBSERVATION REPORT						
1. NAME(Observed Person):		2. DEPARTMENT:		3. DATE:		
4. OCCUPATION:						
5. REASON FOR OBSERVATION:						
Incident Follow-up		Significant Job		Performance check		
Training		Training follow-up		Other		
6.	COULD ANY OF THE PRACTICES OR CONDITIONS OBSERVED RESULT IN HARM TO PEOPLE, PROPERTY OR THE ENVIRONMENT?				YES	NO
7.	WERE THE METHODS AND PRACTICES OBSERVED THE MOST EFFICIENT AND PRODUCTIVE?				YES	NO
8.	DID THE PRACTICES YOU OBSERVED COMPLY WITH EXISTING WORK INSTRUCTIONS AND PRACTICES?				YES	NO
9.	COULD ANY OF THE PRACTICES YOU OBSERVED HAVE A DETRIMENTAL EFFECT UPON THE QUALITY OF THE PRODUCT AND IMPACT ON THE ENVIRONMENT?				YES	NO
10.	DESCRIBE CLEARLY BELOW ANY PRACTICES OR CONDITIONS RELATED TO ITEMS ABOVE THAT DESERVE COMPLIMENT OR CORRECTION.					
11.	SHOULD A FOLLOW-UP OBSERVATION OF THIS WORKER OR JOB BE MADE IN THE NEAR FUTURE?				YES	NO
12.	DESCRIBE ANY FOLLOW-UP ACTIONS THAT SHOULD BE CONSIDERED FOR CHANGE IN THE INTEREST OF OHSE					
13.	Employee NO.					

14. OBSERVER / TRAINER

NAME: _____ TITLE: _____ SIGNATURE: _____

EMPLOYEE/TRAINEE

NAME: _____ TITLE: _____ SIGNATURE: _____

SUPERVISOR/TEAM LEADER:

NAME: _____ TITLE: _____ SIGNATURE: _____

ANNEXURE D: SAFE WORK PROCEDURE/METHOD (SWP)

Maintain Safety Devices (Mechanical)

NO.	STEPS TO BE FOLLOWED	RISK INHERENT TO STEP	PREVENTATIVE SAFETY STEP	PLANNED JOB OBSERVATION	
				PREVENTATIVE SAFETY STEP FOLLOWED Y/N	REMARKS
1.	Always wear correct safety equipment				
2.	Trained competent persons shall only maintain safety devices.				
3.	Clean examine the device for defects, visible damage or any deformity				
4.	Stop and lockout all moving machinery whilst carrying any work or adjustments				
5.	Replace any defective parts or units without delay.				
6.	Ensure that all devices are secured properly				
7.	Ensure that the flame-proofness of any machine is not impaired by using any other type of device not covered by the G.M.E certificate of approval and no alterations shall be made to invalidate this approval				

Planned Maintenance Schedule

NO.	STEPS TO BE FOLLOWED	RISK INHERENT TO STEP	PREVENTATIVE SAFETY STEP	PLANNED JOB OBSERVATION	
				PREVENTATIVE SAFETY STEP FOLLOWED Y/N	REMARKS
1.	Always isolate and lockout equipment before carrying out any P.M. schedule where applicable.	Serious injury to employees.	Train all employees on the use of lockout procedures. Enforce as per standard procedure.		
2.	Always park mobile equipment in a safe and level place.	Run away.	Use park brakes. Stop blocks. Lower F.E.L buckets to touch ground.		
3.	Ensure that grease nipples, etc. are clean before lubricating.	Damage to equipment e.g. bushes and bearings.	Over inspection. Specific lubrication training.		
4.	Always ensure proper support where necessary.	Serious injury to employees. Damage to equipment.	Over inspection. Proper designed supports.		
5.	Always carry out maintenance according to P.M. schedule.	Injury or damage to employees or equipment.	P.M schedules to be posted on notice boards Accessible to all maintenance and operating staff.		
6.	Test equipment before commissioning.	Injury or damage to employees or equipment.	Over inspection. Check Amp meter readings.		
7.	Always ensure to have the correct material and equipment available before starting P.M. schedule.	Prevent production time loss. Injury to employees and or equipment.	On the job training. Over inspection.		

8.	Always clean area and store equipment after job completion.	Injury to employees due to superfluous tools or materials.	On the job training. Over inspection. Disciplinary procedure.		
9.	Always ensure that all guards, covers and panel doors are properly supported and secured during and after maintenance.	Serious injury to employees, Multiple injuries.	Safe work procedures. On the job training. Over inspection.		
10.	Always use the correct tools and equipment for the job.	Hand injuries.	Follow SWP. On the job training. Over inspection. Disciplinary procedure.		
11.	Always wears correct protective clothing.	Injury or damage to employees and equipment.	Follow SWP. Training on the limitations of P.P.E.		
12.	Always report any defects that cannot be rectified immediately.	Injury or damage to employees and equipment.	Report to head of department. Immediately.		

Loading and Unloading Equipment

NO.	STEPS TO BE FOLLOWED	RISK INHERENT TO STEP	PREVENTATIVE SAFETY STEP	PLANNED JOB OBSERVATION	
				PREVENTATIVE SAFETY STEP FOLLOWED Y/N	REMARKS
1.	Always wear correct protective equipment.	Injury to employees usually serious.	Specific training. Over inspection. Disciplinary procedures.		
2.	Ensure never to exceed the capacity of lifting equipment when loading.	Permanent damage to lifting equipment. Injury in case of breakage to employees.	On the job training. Over inspection. Disciplinary procedures.		
3.	Always estimate the load prior to lifting.	Permanent damage to lifting equipment. Injury in case of breakage to employees.	Follow equipment manual recommendations.		
4.	The preferred angle between the legs of the sling is from 50-90 degrees. A wider angle creates additional stresses in the sling legs.	Permanent damage to lifting equipment. Injury in case of breakage to employees.	Specific training. Over inspection. Disciplinary actions.		
5.	Ensure correct balancing of load as off-center loading can be dangerous.	Load can slip sideways, causing injury or damage to employees and equipment.	Specific training. Over inspection. Disciplinary actions.		
6.	Always lift load slowly to enable sling to adjust itself to the load without creating undue shock	Weakening of slings. Injury or damage to employees and equipment.	Specific training. Over inspection. Disciplinary actions.		

	loads.				
7.	Ensure to use hand signals when using a crane.	Prevent accidents normally serious.	Specific training. Over inspection. Disciplinary actions.		
8.	Always secure material properly before transporting.	Injury or damage to employees or equipment.	Specific training. Over inspection. Disciplinary actions.		
9.	Always ensure to have ample room when loading or unloading equipment.	Restricted maneuverability can cause injury or damage.	Over inspection.		
10.	When unloading equipment without lifting equipment use shock absorbing material e.g. Tyres.	Injury or damage to employees or equipment.	On the job training. Over inspection.		

Remove and Replace Sub-Assembly

NO.	STEPS TO BE FOLLOWED	RISK INHERENT TO STEP	PREVENTATIVE SAFETY STEP	PLANNED JOB OBSERVATION	
				PREVENTATIVE SAFETY STEP FOLLOWED Y/N	REMARKS
1.	Always wear correct PPE.	Injury to employees	-Monthly checklist (PPE) - Over inspection		
2.	Stop, isolate and lockout the power.	-Injury to employees _ -Damage to equipment	-On the job training (Lock out procedure) _ -Over inspection		
3.	Disconnect hydraulic hoses, electric cables, water and lubrication pipes where applicable	Pollution _ Electrical short circuit (fire hazard) _ Confined space entry	Specific on the job training _ Over inspection		
4.	Plug all hydraulic hose ends to prevent the ingress of dirt and oil spillage.	-Damage to company equipment _ Confined space entry	Proper on the job training _ Over inspection		
5.	Ensure that the unit is properly supported and remove all mounting bolts.	Falling objects _ Damage to company equipment _ Confined space entry	Proper on the job training _ Over inspection		
6.	Remove the subassembly by proper means and leave it at the designated place for despatch.	-Lifting equipment - Falling Objects _ Confined space entry	-Specific lifting equipment -Training - Over inspection		
7.	Install the replacement unit, line it up, insert all mounting bolts and tighten.	-Lifting equipment -Falling objects - Confined space entry	-Over inspection - Specific lifting equipment - Training		
8.	Reconnect all hydraulic hoses, electric cables, water and lubrication pipes where applicable	-Pollution - Electrical short-circuits - Fire hazard	-Specific on the job training - Over inspection		

		- Confined space			
9	Restore the power and test the unit	-Injury to employees Damage to company equipment	Over inspection		

V-belt changing

NO.	STEPS TO BE FOLLOWED	RISK INHERENT TO STEP	PREVENTATIVE SAFETY STEP	PLANNED JOB OBSERVATION	
				PREVENTATIVE SAFETY STEP FOLLOWED Y/N	REMARKS
1.	The appointed and authorized person may only carry out task.	Injury or Damage	Appointed person only has access		
2.	Notify all teams of time HT will be switched on or off	Injury or Damage	Verbal communication		
3.	Unlock substation doors and keep open.	Hindered Exit	Hold doors open by physical means.		
4.	Enter in Log book	Loss of history/trends	Write in manually		
5.	Ensure "Buddy" present.	Delay in treatment or help	Work in pairs		
To re-set Oil-filled circuit breaker (OCB)/ Circuit breaker (CB)					
6.	Test for power	Damage or injury	Use 11kv tester		
7.	Identify Breaker	Damage or injury	Visual confirmation		
8.	Reset alarm on panel	Damage or Injury	Manual/Physical task		
9.	Switch off all fuse switches in Substation	Damage or Injury	Manual/Physical task		
10.	Put on Flash Suit	Injury	Physical task		
11.	Charge spring with handle	Damage or Injury	Manual/Physical task		
12.	Push handle down to close breaker	Damage or Injury	Manual/Physical task		
13.	Switch all fuse switches on	Damage or Injury	Manual/Physical task		
14.	Test for power	Damage or injury	Use 11kv tester		

15.	Notify all teams HT is switched on.	Injury or Damage	Verbal communication		
To Switch off OCB/CB					
16.	Identify Breaker	Damage or injury	Visual confirmation		
17.	Press off button to trip OCB	Damage or injury	Visual confirmation		
18.	Test for power	Damage or injury	Use 11kv tester		
19.	Unlock OCB	Damage or injury	Manual/Physical task		
20.	Rack switch down to earth	Damage or injury	Manual/Physical task		
21.	Pull carriage out of frame	Damage or injury	Manual/Physical task		
22.	Test cable side of OCB for power	Damage or injury	Manual/Physical task		
23.	Notify all teams HT is switched off.	Injury or Damage	Verbal communication		
24.	Close substation doors and lock				

Working in Confined Spaces

NO.	STEPS TO BE FOLLOWED	RISK INHERENT TO STEP	PREVENTATIVE SAFETY STEP	PLANNED JOB OBSERVATION	
				PREVENTATIVE SAFETY STEP FOLLOWED Y/N	REMARKS
1.	<p>Ensure that the confined area is safe to enter.</p> <p>If a possibility exists that toxic/ flammable gasses are present, tests must be conducted by a person with the knowledge and instruments</p>	<p>Sickness</p> <p>unconsciousness</p> <p>Injury to workers</p>	<p>Inspections</p> <p>Specialists/ experts</p> <p>First aid</p>		
2.	<p>Purge the confined space with ventilation if uncertain with how safe is the area</p>	<p>Inhalation of gasses and fumes</p> <p>Disease</p> <p>Fire</p>	<p>Emergency procedure</p> <p>First aide</p> <p>Fire procedure</p>		
3.	<p>If the atmosphere cannot be cleared, proper breathing apparatus must be worn by the person entering the confined space</p>	<p>Inhalation of gasses and fumes</p> <p>Disease</p> <p>Fire</p> <p>unconsciousness</p>	<p>Emergency procedure</p> <p>First aide</p> <p>Fire procedure</p>		